Contributions from the Department of Biology, University of Western Australia, No. 7.

Some New Species of Megascolex from South-Western Australia,

by **Professor G. E. Nicholls,** D.Sc., F.L.S., and **Ada A. Jackson,** B.Sc.

(*Read* July 13, 1926. *Published* August 10, 1926.)

Until the visit of Drs. Michaelsen and Hartmeyer to Western Australia in 1905 no attempt seems to have been made to collect earthworms in this part of the Continent. The report by Dr. Michaelsen on this portion of the collection made by the German South-West Australian Expedition constitutes Part II of the first volume of "Die Fauna Sudwest-Australiens, 1909." In this paper is recorded the finding of no fewer than fifty-two species, referred to eighteen genera, and of these, thirty-four endemic species were previously undescribed. These new species all belong to the family Megascolecidae and are noted as being of quite small size.

The stay made in Western Australia by the members of this Expedition was of very limited duration and the search covered but a comparatively small area of the State. It was highly probable, therefore, that many more species remained to be discovered. At the end of the last University session a Field Instructional Class was held for a fortnight, in the region of the Nornalup Inlet, and a large amount of material, much of it apparently new, was obtained. Two of the worms here described were secured at this time, both of them being remarkable for their relatively large size. Others which were also obtained in this locality are now being investigated.

It has already been pointed out (Nicholls, 1922) that, as regards fluviatile forms, Michaelsen's statement that these are very rare does not prove to be correct. Some, such as *Pristina*, are everywhere, others, as *Dero*, *Chaetogaster* (several species of each), *Aclosoma*, etc., are quite common, and representatives of other families, such as Tubificids and Enchytraeids, are comparatively abundant.

Megascolex longicystis sp. nov.

Plate XVIII, Figs. 1, 2.

A number of specimens of this worm were collected at Armadale by Miss Fordham and one of us (G.E.N.). It is obviously closely related to *Megascolex collinus*, described by Michaelsen from Broome Hill (1905), resembling that species closely in the extreme development of the diverticulum of the spermatheca, which in both forms is from five to six times as long as the spermatheca itself. Close examination revealed, however, the following differences: the spermathecal pores are closer together than in *M. collinus*, the pair of papillae on furrow 19/20 is wanting, and a third pair of sperm sacs is present in segment 10. Michaelsen had but one damaged specimen to work on and consequently was obliged to query one or two of his statements, but even after allowing for the possibility of incompleteness in the description from this cause, there seems to be here sufficient difference to require the establishment of a new species.

Specific Diagnosis. Length, 70-80 mm.; thickness, 3 mm.; number of segments about 100.

Colouring: Purplish-brown dorsally, fading to yellowish-white ventrally. There is a dark mid-dorsal line running the whole length of the worm, but the snout and posterior end are white tipped.

The clitellum is noticeable only as a slightly paler band covering segments 14-18. After prolonged preservation in spirit all colouring is lost and the clitellum becomes indistinguishable except for a very slight flattening of the ventral surface of those segments.

The setal line is unbroken. The setae themselves are slender and sigmoid, with a slight nodulus which is only occasionally noticeable.

The head is epilobate. The prostomium is rounded and has a somewhat V-shaped projection into the peristomial segment. The peristomial segment itself has a distinct ventral groove.

There are two pairs of spermathecal pores (Pl. XVIII, fig. 1) on the anterior margins of segments 8 and 9. These are invisible to the unaided eye, but under the microscope they are seen to lie in the third line of setae on each side.

The male pores are on a pair of small round papillae which take the position of the second seta on each side in segment 18.

Dorsal pores are present, the first one occurring between segments 4 and 5.

Anatomy. Gut: A large gizzard occurs in segment 6. There are no calciferous glands, and the mid-gut is without a typhlosole.

Circulatory system: The last heart is in segment 13.

Nephridial system: Micronephridia occur throughout the length of the worm.

Male reproductive organs: There are three pairs of sperm sacs projecting from septa 9/10, 10/11, 11/12 into segments 10, 11, and 12. They are slender and rather finger-like in appearance, the first pair being slightly smaller than the other two. The spermiducal glands lie in segments 18. They are flattened and leaf-like and have an S-shaped muscular duct.

The spermathecae (Pl. XVIII, fig. 2) are pear-shaped and have a long, slender diverticulum which is from five to six times as long as the spermatheca itself. This diverticulum is sometimes loosely coiled, and may extend straight backwards through several segments.

Megascolex swarbricki sp. nov.

Plate XVIII, Figs. 6-10.

Numerous specimens of this worm were found at Nornalup, under logs in swampy patches along the banks of the Deep River, and also from beneath logs in some of the damper valleys running down to the Frankland River. Their unusual size and glandular arrangement serve to distinguish them from any species previously described. The new species is named in compliment to Mr. T. H. Swarbrick, to whose enthusiastic assistance the field instruction class of the Biology Department of the University was greatly indebted.

Specific Diagnosis. Length, 160 mm.; breadth 5 mm.; number of segments, about 188.

Colouring: Dorsally, greyish-brown; ventrally, yellowish-white.

The clitellum is saddle-shaped and extremely thick (Pl. XVIII, fig. 8), and extends over segments 13 to 19. In the anterior part of the 13th segment, and posterior part of the 19th, it is dorsal only, but in segment 18 it passes ventrally as far as setal line c.

In transverse section it is seen to consist of a thick layer of unicellular glands which open to the outer surface of the clitellum. Each gland consists of an oval nucleated cell and a narrow duct, which is of course much longer in the case of the deep-seated cells than of those near the surface. Between the glands may be made out the many fine branching bloodvessels.

The head is tanylobate, the dorsal projection of the prestomium having a distinct transverse furrow at the base.

The first dorsal pore lies between segments 4 and 5.

The male pores are very close together (Pl. XVIII, fig. 9) and are situated in segment 18 at the apex of an oval papilla, which has a transverse furrow both in front and behind the pores (Pl. XVIII, fig. 6).

The female pores lie in segment 14, near to the mid-ventral line, but they cannot readily be made out without having recourse to serial sections.

There are two pairs of spermathecal pores, between segments 7 and 8, and 8 and 9. They are mid-ventral in position, extremely close together, and lie in a small oval depressed area.

The accessory glands consist of two pairs of glandular papillae lying intersegmentally (19/20 and 20/21) and all equidistant from the mid-ventral line. In one specimen from the Deep River another papilla was found at 21/22, lateral but unpaired, which condition was observed, also, in several specimens taken from the Frankland River region. In others, again from the Frankland, the third pair of glands was complete. Where three pairs were present, the last two were always slightly closer together than the others.

Anatomy. None of the septa show any distinct thickening.

Gut: There is a large gizzard in segment 6. The oesophagus has a vascular swelling in each of segments 10-14, that in segment 14 being the largest.

Circulatory system: The last heart is in segment 13.

Nephridial system: Micronephridia are present throughout the entire length of the worm.

Male reproductive organs: Three pairs of sperm sacs are present on septa 9/10, 10/11, and 11/12, projecting into segments 10, 11, and 12. They are thick and seem to be made up of a number of small lobes closely pressed together and flattened. The sacs of the third pair are the largest. There is a pair of free testes and related funnels, in both segments 10 and 11. The spermiducal gland is flat and leaf-like, very little longer than wide, and projects into segments 17 and 19. The duct opens into the posterior lobe of the glandular mass.

The spermathecae (Pl. XVIII, fig. 7) are sac-like, with a spherical enlargement. The diverticulum is usually about two-thirds the length of the main body, although in some specimens it reaches an equal length. It opens from the spermathecal duct, which is very short. In section, the ducts from each side are seen to open to the exterior side by side on the mid-ventral line, so

close as to make the opening almost appear to be a common pore (Pl. XVIII, fig. 10).

Megascolex affinis sp. nov.

Plate XVIII, Figs. 3, 4, and 5.

This worm comes from the South-West of Australia, but unfortunately the locality label has been lost; only one specimen was obtained. It approaches very closely to *Megascolex imparicystis*, the chief point of difference being the reduction of the accessory glands to what appear to be mere thickenings of the body wall in the median ventral region intersegmentally at 17/18 and 18/19. Dissection shows that a rudimentary third pair of sperm sacs is present on septum 12/13, projecting into segment 13. This is an unusual condition, for, as a rule, when three pairs of sperm sacs occur they lie in segments 10, 11 and 12. Other points of difference are: the length of the duct of the spermiducal gland, which is greater than that of the same duct in *M. imparicystis* as described by Michaelsen, being slightly longer than the glandular mass; the beginning of the mid-gut in segment 17 instead of in segment 18; and the occurrence of strongly developed muscle strands connecting the thickened septa in the anterior region. Michaelsen does not mention the occurrence of such strands in *M. imparicystis*. In the present species the strongly developed condition of these muscles and the cup-like shape of the thickened septa which they connect are very reminiscent of the same structures in *Megascolides australis*.

Specific Diagnosis. Length (in spirit): 140 mm.; breadth, 8 mm.; number of segments, 105.

Colouring: Greyish brown dorsally, yellowish-white ventrally. There is no visible clitellum.

There are five unpaired spermathecal pores lying mid-ventrally in furrows 4/5 to 8/9 (Pl. XVIII, fig. 3).

The male pores are in segment 18, close to the mid-ventral line, and are not marked by the presence of papillae.

There are no obvious accessory glands, but there is an extremely small transverse swelling in the mid-ventral region of furrows 17/18 and 18/19.

Dorsal pores are present.

Anatomy. Septa 7/8 to 15/16 are thickened, and are connected by muscle strands. Of these, septa 7/8 and 15/16 are but slightly thickened, while the intermediate septa 8/9 to 14/15 are very thick.

Gut: There is an extremely large and well-formed gizzard in segment 6. The oesophageal wall is thickened and swollen in segments 10 to 14. The mid-gut, which is very distinctly marked off from the oesophagus, has no typhlosole, and begins in segment 17.

Circulatory system: The last heart is in segment 13.

Nephridial system: Each segment bears six micronephridia on each side, all disposed in the same plane.

Male reproductive organs: (Pl. XVIII, fig. 5). Three pairs of sperm sacs occur. They project from septa 10/11, 11/12, and 12/13 into segments 11, 12, and 13. The second pair is the largest, but they are all comparatively small. The third pair is little more than a slight finger-like projection from the septal tissue. The spermiducal glands are in the posterior half of segment 18, and have a distinct duct, straight, and slightly longer than the glandular region. The glandular region itself is irregular in outline, rather oval, and flattened.

The spermathecae (Pl. XVIII, fig. 4) are sac-like, with a short, stout duct into which the diverticulum opens. They are median and unpaired, and the diverticulum is about half as long as the spermatheca itself.

List of References.

1906 Michaelsen, "Das Tierreich," Part 10. Oligachaeta.

1909 Michaelsen, "Die Fauna Sudwest-Australiens." Vol. I, Pt. 2. Oligochaeta.

1909 Bage, "Contributions to our knowledge of Australian Earthworms." The Nephridia. Proc. Roy. Soc. Victoria. Vol. XXII, Pt. II.

1922 Nicholls, "Dero roseola." Journal Roy. Soc. W.A., Vol. VII.

Explanation of Plate XVIII.

Fig 1 *M. longicystis,* External view.

2 *M. longicystis,* Spermatheca.

3 *M. affinis,* External view.

4 *M. affinis,* Spermatheca.

5 Semi-diagramatic sketch of part of the internal anatomy of same.

6 *M. swarbricki,* External view.

7 *M. swarbricki,* Spermatheca.

8 Transverse section through clitellum of the same, showing the thickening of the glandular layer.

9 Transverse section through the male genital region of the same showing the openings of the spermiducal ducts.

10 Transverse section through the spermathecal region of the same showing the close approximation of the spermathecal pores.

REFERENCE LETTERS.

b. sp., base of spermatheca; br., brain; b.w., body wall; blv., blood vessel; c.m., circular muscle; ep., epidermis; giz., gizzard; gl.c., gland cells; l.m., longitudinal muscle; m.g., mid-gut; m.p., male pore; n.c., nerve cord; neph., duct of nephridium; oes., oesophagus; ph.gl., pharyngeal gland; sp., spermatheca; sp.d., spermiducal duct; sp.gl., spermiducal gland; sph., spermatophore; sp.p., spermathecal pore; sp.s., sperm sac.

Printed for the Royal Society of Western Australia by R. S. Sampson, 971-973 Hay Street, Perth.